



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,271	10/15/2003	Manoi K. Bhattacharyya	10014246-1	7212

22879 7590 08/22/2005

HEWLETT PACKARD COMPANY  
P O BOX 272400, 3404 E. HARMONY ROAD  
INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS, CO 80527-2400

EXAMINER

NGUYEN, VAN THU T

ART UNIT PAPER NUMBER

2824

DATE MAILED: 08/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b> 10/686,271	<b>Applicant(s)</b> BHATTACHARYYA ET AL.	
	<b>Examiner</b> VanThu Nguyen	<b>Art Unit</b> 2824	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2,3 and 6-30 is/are allowed.
- 6) ☒ Claim(s) 1,5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/15/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

***Response to Amendment***

1. This Office Action is in response to Amendment filed on July 22, 2005
2. Claims 1-3, 5-30 are present for examination.
3. Claim 4 is cancelled.

***Response to Arguments***

4. Applicants' arguments filed July 22, 2005 have been fully considered but they are not persuasive.

Applicants argue that Fukami does not teach or suggest applying a magnetic field to the memory cell, **the magnetic field having a magnitude less than a magnitude required to alter the magnetization orientation of the memory cell.** Examiner disagrees with this statement.

Applicants have cited more than one passages to support the argument, such as column 7, lines 28-35 and column 16, lines 27-39. However, one of those passage is incomplete.

Fukami teaches:

**In view of assured reproduction without destroying recorded information, a magnetic field produced by word current is preferably large than the magnetic field reversing the magnetization of the magnetic layer having a small coercive force and smaller than the magnetic layer reversing the magnetization of the magnetic layer having a large coercive force (column 6, lines 40-45).**

Although in the above Example 1 the magnetic field produced by word current for reproduction is about 10 Oe, a large change in voltage occurs when the magnetic field produced by word current for reproduction is from about 9 Oe to about 20 Oe as shown in FIG. 6 showing the results of measurement on a change in voltage across the sense line with varying word current for reproduction (i.e., word magnetic field produced by word current for reproduction). As apparent from FIG. 3, this is because a change in resistance occurs when the magnetization of only the first magnetic layer 5a is reversed with that of the second magnetic layer 5b remaining unreversed with the result that the respective directions of magnetization of the adjacent magnetic layers become antiparallel to each other. **Accordingly, in general the reproduction word current is set so that the**

**reproduction word magnetic field produced thereby would meet the following condition: magnetic field reversing the magnetization of the first magnetic layer 5a < reproduction word magnetic field < magnetic field reversing the magnetization of the second magnetic layer 5b (column 16, lines 25-46)**

If the reproduction word magnetic field is within the specified range, the recorded information are not destroyed (i.e. magnetization orientation of the memory cell not being altered) when being reproduced/read. Therefore, Fukami does suggest applying a magnetic field to the memory cell, the magnetic field having a magnitude less than a magnitude required to alter the magnetization orientation of the memory cell.

Applicants also argue that Fukami does not teach or suggest **observing any change in resistance** of the memory cell as the magnetic field is applied; determining the magnetization orientation **based upon the observed change in resistance of the memory cell**.

In response to these arguments, Applicants' attention is directed to either prior Office Action, paragraph 4, or this Office Action, paragraph 6.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 1, 5** are rejected under 35 U.S.C. 102(b) as being anticipated by Fukami et al. (U.S. Patent No. 5,448,515).

**Regarding claim 1**, Fukami discloses, in FIGS. 12-15(c), a method for reading the magnetization orientation of a memory cell, the method comprising:

Art Unit: 2824

applying a magnetic field to the memory cell (via current I<sub>3</sub>), the magnetic field having a magnitude less than a magnitude required to alter the magnetization orientation of the memory cell;

observing any change in resistance of the memory cell as the magnetic field is applied (via voltage V <sub>$\alpha\beta$</sub>  across points  $\alpha$  and  $\beta$ , see FIG. 12; because change in resistance is proportional to change in voltage); and

determining the magnetization orientation based upon the observed change in resistance of the memory cell (i.e. parallel or anti-parallel)

(See column 6 lines 40-45, column 16 lines 25-46, and column 22 lines 31-54).

**Regarding claim 5**, Fukami discloses, in FIG. 15(c), the memory cell comprises a sense layer (b) having an alterable magnetization orientation and a reference layer (a) having a fixed magnetization orientation, and wherein the sense layer is shaped to enhance an edge domain effect of the memory cell.

***Allowable Subject Matter***

7. Claims 2-3, 6-30 are allowed.

8. The following is a statement of reasons for the indication of allowance:

The prior art made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations. Fukami, Perner et al., and Sakakima et al., taken individually or in combination, do not teach the claimed invention having the following limitations, in combination with the remaining claimed limitations:

Art Unit: 2824

(i) wherein the magnetic field is a negative magnetic field and wherein determining the magnetization orientation includes determining the memory cell is in a parallel magnetization orientation if there is a change in resistance of the memory cell (as in claim 2); or

(ii) wherein the magnetic field is a negative magnetic field and wherein determining the magnetization orientation includes determining the memory cell is in an anti-parallel magnetization orientation if there is no change in resistance of the memory cell (as in claim 3);  
or

(iii) a method for reading data from a selected memory cell in an array of memory cells comprising steps of: reversing the first current in the first write line; detecting any change in resistance  $R$  of the selected memory cell as the reversed first current is supplied to the first write line; and determining the magnetization orientation of the selected memory cell based on the detected change in resistance  $R$  of the selected memory cell as the first current and the reversed first current are supplied to the first write line as in claim 6); or

(iv) a method for detecting the magnetization orientation of a memory cell comprising steps of: replacing the second magnetic field with a third magnetic field; and observing changes in the resistance of the memory cell under the influence of the first and third magnetic fields (as in claim 13); or

(v) a system for reading the magnetization orientation of a memory cell comprising: a current source for applying a variable current to the first conductor and a corresponding variable magnetic field to the memory cell (as in claims 22 and 28);

***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to VanThu Nguyen whose telephone number is (571) 272-1881. The examiner can normally be reached on Monday-Friday, 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

Art Unit: 2824

system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

August 18, 2005

A handwritten signature in black ink, appearing to read 'VanThu Nguyen', with a stylized flourish at the end.

VanThu Nguyen  
Primary Examiner  
Art Unit 2824